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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/827,254	04/20/2004	Koichi Kondo	251354US2RDDIV	2392

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EXAMINER	
SAXENA, AKASH	
ART UNIT	**PAPER NUMBER**
2128	

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	03/01/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 03/01/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/827,254	KONDO, KOICHI	
	Examiner	Art Unit	
	Akash Saxena	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 5-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1,2 and 5-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claim(s) 1-2 and 5-8 has/have been presented for examination based on amendment filed on 17th November 2006.
2. Claim(s) 1, 5, 7 and 8 is/are amended.
3. Claim(s) 3-4 and 9 is/are cancelled.
4. Claim(s) 1-2 and 5-8 remain rejected under 35 USC § 102 as anticipated by Ponamgi.
5. The arguments submitted by the applicant have been fully considered. Claims 1-2 and 5-8 remain rejected and this action is made FINAL. The examiner's response is as follows.

Response to Applicant's Remarks & Examiner's Withdrawals

6. Examiner withdraws the claim rejection(s) under 35 USC § 101 to claim(s) 9 in view of the applicant's cancellation of the claim.
7. Examiner withdraws the claim rejection(s) under 35 USC § 103 to claim(s) 9 in view of the applicant's cancellation of the claim.

Specification

9. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Abstract exceed 150 words.

Response to Applicant's Remarks for 35 U.S.C. § 102

10. Claims 1-8 were rejected under 35 U.S.C. 102(b) as being anticipated by Ponamgi.

Regarding Claim 1-8

Applicant has argued the following:

> The claimed invention is directed to a method and apparatus using shape data obtained by the approximation of analytic surfaces from polygons in kinematics simulation. None of the references cited in the outstanding Office Action discloses or suggests such a method or apparatus.
>
> Ponamgi concerns an interference detection (interference check) and does not describe any kinematics simulation, or a kinematics simulation unit configured to perform a kinematics simulation. The position and orientation of a three-dimensional shape in a three-dimensional space are obtained as a result of performing a kinematics simulation. An interference check is not a kinematics simulation. The kinematics simulation according to claim 1 computes how components of a mechanism (as a non-limiting example, links, etc.) move while satisfying the constraint relationships which are mechanically present in the shapes of revolute joint, slide joint, slip among planes, etc. Performing a kinematics simulation as recited in claim 1 corresponds to the process of obtaining the position and orientation of components (as a non-limiting example, links, etc.) as of an individual mechanism. The assembly model according to the present invention expresses such constraint conditions, which are to be satisfied, as geometric constraints and defines those geometric constraints with reference to the analytic surfaces extracted from polygons. The method of claim 1 is not suggested by Ponamgi.
>
> The Office Action refers to FIG. 8 Ponamgi, which shows where a circular hole is provided in a disk with their centers being consistent with each other. FIG. 8 is an example of a face having two boundaries. In such a case, Ponamgi describes that in order to express the shape of one component, a shape expression of a nested structure is employed in the positional relationship where the center axes coincide. However, such a description is nothing but a technique to structuralize and express one component shape so that the interference check can be efficiently performed. The technique is not directed to handle any relationship between different components (for example, links). Further, no constraint relationship to be satisfied by the expression of the geometric constraints is defined.

Examiner respectfully traverses applicant's arguments that Ponamgi does not teach kinematics simulation, i.e. movement while satisfying constraints. By definition collision of two objects involved movement and simulation of such a phenomenon represents a kinematics simulation. As a non-limiting example, applicant has cited, links in a chain, and interaction between the links. Ponamgi illustrates the exact example and shows that his kinematics simulation performs such complex

movement while satisfying the constraint relationships (Ponamgi: See Fig.12 Section 5). Ponamgi obtains position and orientation information (Ponamgi: Fig.12; Pg.19-20 - Section 5 – chain interlocked Tori – made from polyhedron- using octree with hierarchies having relation and position).

Applicant argument that "The technique is not directed to handle any relationship between different components (for example, links)" is further deficient as interaction/collision between the links of the chain (as shown in Fig.12) would require handling of any relationship between components (again shown as links/ or interlocked tori).

Applicant has further argued that:

> The Office Action also states that page 21 of Ponamgi provides similar descriptions as in the present application. In Ponamgi, the shape of a thread is approximated to a polygon and an interference check is performed based thereon. On the other hand, the present invention is directed to the computation in which the shape data in polygonal expression is handled as an input and the shape data including analytic surfaces is handled as an output. Therefore, the method of claim 1 is clearly not suggested by Ponamgi.

Examiner again disagrees with the applicant as the shape is approximated by polygons which represents the analytical surface of the (Ponamgi: Pg.21 ¶3rd; Also Pg. 19 Section 5¶1-2 – tori(link) shape object in the toroidal chain approximated by polygons where the combination represents an analytical surface). Further such an approximation is also shown to be performed for analytical surface of nut and bolt (Ponamgi: Pg.21 ¶3rd).

No new arguments are presented for claim 5.

Applicant's amendment to claim 1 switching between mechanical and kinematics simulation is noted, however, but the intent of the switch is unclear. Applicant's argument regarding inherency are considered and are found to be unpersuasive.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Technical report "Incremental algorithms for collision detection between solid models" by M.K. Ponamgi et al in 1994-97 (Ponamgi hereafter). Also published in IEEE[1].

Regarding Claim 1

Ponamgi teaches a method of *mechanical* simulation (Ponamgi: Introduction - as interaction & collision between solid models simulation) using polygonal shape data (using polytopes – which are polygons in 2D and polyhedrons in 3D- Pg.4) in which at least a portion of a shape is approximated by a combination of a plurality of polygons (Ponamgi: Abstract, Introduction); the method comprising obtaining shape data of analytic surface expression by fitting partial sets of the polygons to analytic surfaces (Ponamgi: Pg.21 ¶3rd), wherein the analytic surfaces include at least one of a cone, torus, and cylinder (Ponamgi: Torus-Pg.10 Section 4.2 ¶1, Fig.6, Fig,12; Cylinder – Pg. 13 Fig.8, Pg.21 Fig-13 –Body modeled as cylinder); generating an assembly model based on a pair relationship (Ponamgi: Fig.13, Fig,11) including

coaxial relationship between the analytic surfaces (Ponamgi: Fig.8), the assembly model expressing a positional relationship among a plurality of components thereof (Ponamgi: Fig.13, Section5.1) and the positional relationship corresponding to the pair relationship (Ponamgi: Pg.19-20 - Section 5 – chain interlocked Tori – made from polyhedron- using octree with hierarchies having relation and position); and performing a *kinematics* simulation by computing positions of the components according to the positional relationship (Ponamgi: Section 5 – chain interlocked Tori simulation; Section 4.1 Thread insertion simulation).

Regarding Claim 5

Ponamgi teaches an apparatus (Ponamgi: Pg. 22) where the limitations presented in claim 5 are similar to claim 1 limitations and are rejected likewise.

Regarding Claim 6

Ponamgi teaches selecting at least one or more polygons from the polygonal shape data in accordance with a predetermined selection criterion (Ponamgi: Pg. 21¶3); and determining an analytic surface to be assigned for the one or more polygons (Ponamgi: Pg.21 ¶3 – using polygon to make threads and cylindrical body).

Regarding Claim 7

Ponamgi teaches calculating a first representation of a first analytic surface of a first component (Ponamgi: Pg. 21-22, the threads in bolt); calculating a second representation of a second analytic surface of a second component (Ponamgi: Pg. 21-22, the threads in nut); and performing an interference check for checking the

[1] Incremental algorithms for collision detection between polygonal models; Ponamgi, M.K.; Manocha, D.;

presence/absence of geometric interference between the first component and the second component, according to the first representation and the second representation (Ponamgi: Table 2, Pg. 21-22 as collision detection between the nut and bolt). All the above mentioned representations are performed by a computer simulation, hence the apparatus implementation of the above are also taught by Ponamgi (Introduction).

Regarding Claim 8

Ponamgi teaches first representation includes a central axis of the first component and the second representation includes a central axis of the second component as first (bolt) and second component (nut) and the collision algorithm applied to detect all possible contacts between the polygons forming these components which are centroid axis aligned (Ponamgi: Pg. 20-21, Pg. 10 Section 4.2; Pg.2 Axis Aligned for each component)

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Akash Saxena whose telephone number is (571) 272-8351. The examiner can normally be reached on 9:30 - 6:00 PM M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini S. Shah can be reached on (571)272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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